US LHC Accelerator Research Program
Task Sheet

Task Name: Potential improvements of the LHC collimation system performance
by using channeling crystals

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Statement of work: In FY06, experimental proof-of-principle studies will performed at the Tevatron collider to reliably demonstrate reduction of beam loss in the interaction region by replacing the amorphous primary collimator with an optimal bent crystal. The experiment at the SPS H8 beam line is planned to characterize the bent crystal with a 450-GeV proton beam to separate the channeling, volume channeling and reflections from atomic planes. Integration of channeling code and MARS Monte Carlo codes will start.

In FY07, the analyses of experimental results will be performed and, if needed, experiments will continue. MARS-CATCH integration will be completed. Realistic modeling of bent crystal based collimation will be performed for LHC.

Milestones and deliverables

1. Prepare and perform crystal collimation experiment at Tevatron (FY06 Q4).
2. Participate to the channeling experiment at the SPS H8 beam line
   (FY06 Q4).
3. Start integration of the crystal channeling code CATCH and shower
   simulation code MARS15 (FY06 Q4).
4. Perform analyses of experimental data from the Tevatron collimation and
   SPS characterization experiments (FY07 Q1).
5. Planning follow-up crystal experiments with improved beam diagnostics;
   completion the CATCH-MARS integration (FY07 Q2).
6. Launch simulation studies of crystal-based collimation at LHC (FY07 Q3).
7. Follow-up experimental studies of channeling if needed; realistic
   modeling of the LHC collimation system based on channeling crystal (FY07
   Q4).

Budget estimate: (all FNAL)
FY06: 25k$
FY07: 45k$